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The effects of reducing the entitlement period to unemployment insurance benefits☆

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ABSTRACT

This paper uses a difference-in-differences approach exploiting a substantial reform of the Dutch unemployment insurance law and a regression discontinuity design based on policy discontinuities prior to the reform to study the effects of the benefits entitlement period on job finding and subsequent labor market outcomes. Using detailed administrative data covering the full population, both identification strategies show that reducing the entitlement period increases the job finding rate. We find mixed results for the quality of the job-worker match, which we attribute to differences in the time period and the group of affected unemployed workers. However, all our estimation results show that a shorter benefits entitlement period substantially increases cumulative earnings. These increases in earnings are larger than the cumulative reduction in benefits payments.

1. Introduction

In most continental European countries the welfare state expanded until the early 1990s. Since then the generosity of benefits schemes has been reduced gradually. But compared to other OECD countries, continental European countries still provide generous benefits (e.g. Immervoll and Richardson, 2011). The Netherlands is no exception. Until 2006, the entitlement period to unemployment insurance (UI) benefits could be up to five years and most workers received 70% of their last earned gross wage during this period.

Providing benefits for inactivity causes moral hazard problems. Unemployed workers may exert too little effort to find work or become more selective in which job offer to accept. Being selective is not always bad. Unemployment benefits act as a search subsidy, i.e. individuals can financially survive without work and are not forced to immediately start working in the first available job, which might be ill-suited for them. In a system with generous benefits, the quality of the match between worker and job may, therefore, be better.

In this paper we study the effects of the length of entitlement to UI benefits on the exit rate from unemployment and on subsequent labor market outcomes. We adopt two identification strategies. First, we exploit a substantial reform in the Dutch UI law in October 2006. Both before and after the reform the length of the entitlement period depended on the individual labor market history, which is a function of age and the number of years employed. The reform reduced the shortest entitlement period from six to three months, and the longest entitlement period from 60 to 38 months. For some workers the entitlement period did not change or even slightly increased, which allows us to use a difference-in-differences model to separate calendar time effects from the effects of the changed UI entitlement period. Second, we use that before the reform of October 2006, the UI entitlement period was a step function of labor market history. In a regression discontinuity design we exploit that the actual age on January 1, 1998 determines the age component in the labor market history. Being born just before or after January 1, can change the UI entitlement period by up to twelve months.

Job search theory predicts that the duration of unemployment increases when the benefits entitlement period is extended. Empirical evidence confirms this prediction. Van Ours and Vodopivec (2006) exploit changes in the Slovenian UI system and show that reducing the entitlement period increases the exit rate to work and to other destinations. Lalive (2008) finds that for Austria extending the entitlement to benefits for 50 years old from 39 to 209 weeks reduces the job finding rate.

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Card and Levine (2000) find mixed evidence of an extended benefits program. A state level comparison shows that exit rates from the UI benefits scheme remain largely unaffected, but individual data show a significant reduction in exit rates. Schmieder et al. (2012) use discontinuities at ages 42, 44 and 49 in UI entitlement to show that the effect of the entitlement period on the unemployment duration does not vary over the business cycle.

Reduced job finding rates due to longer benefits entitlement are not necessarily bad, if the quality of worker-job matches improves. This is the case if a longer benefits entitlement period allows workers to be more selective. But reduced job finding due to longer benefits entitlement periods, may also cause more skill depreciation and job opportunities to decline. It is an empirical question which of these countervailing forces prevails and at which margins. Card et al. (2007), Lalive (2007) and Bennmarker et al. (2013) do not find any effect on post-unemployment wages, while Schmieder et al. (2016) find that increasing the UI entitlement period decreases post-unemployment wages. In contrast, Centeno and Novo (2009), Cockx and Picchio (2013) and Nekoei and Weber (2017) find a positive but small effect of extending UI benefits on post-unemployment wages.

We make two contributions to the literature. First, whereas earlier studies only consider a specific margin where exogenous variation in the benefits entitlement period is generated, our UI reform and the pre-reform discontinuities in UI entitlement provide more variation along the full distribution of individuals.[1] This allows us to study more thoroughly for which individuals and at which moment the UI benefits entitlement period has an impact. Second, we follow individuals for several years after leaving the benefits system and the data contain many post-unemployment outcomes such as earnings, working hours, type of contract and sector. Our two identification strategies allow us to estimate the effect of the entitlement period in two different time periods, a period of economic downturn and a period of economic growth. Therefore, we provide a more extensive analysis on the effect of the UI entitlement period on the match quality between the worker and her job.

In the empirical analysis, we use administrative data on all UI benefits spells which started between January 2004 and December 2008 in the Netherlands. This includes in total over 500,000 spells. We combine these data with other administrative datasets provided by Statistics Netherlands to observe demographic and socioeconomic characteristics as well as post-unemployment labor market outcomes. For the period until 2010 we observe earnings, working hours and type of contract in all jobs after unemployment. In addition, we observe eligibility and receipt of other types of benefits.

The estimation results for the effects on job finding from our difference-in-differences analysis and regression discontinuity approach concur even though identification in the two methods comes from different time periods and different groups of individuals. The empirical results support the earlier literature that reducing the entitlement period to UI benefits increases job finding rates. The effects on job finding rates are positive from the start of unemployment, but peak just before the end of UI benefits entitlement. Cumulative UI benefits payments are significantly lower, but this is more than fully compensated by additional earnings from work.

Previous studies on the effects of the entitlement period on job quality find mixed results. We find mixed results for job quality as well. For the difference-in-differences analysis – which estimates the effects of reducing the UI entitlement period in a period of declining unemployment rates – we find a modest negative effect on wages and a positive effect on accepting a temporary job immediately after unemployment. These results suggest that unemployed workers lower their reservation wages and job demands when faced with a shorter UI entitlement period. The long-run effects show increased job turnover, increasing the probability of having a permanent contract and more working hours three years after becoming unemployed. On the other hand, the regression discontinuity analysis – which estimates the effects during a period of increasing unemployment rates – suggests that reducing the entitlement period has no effects on wages or the probability of accepting a temporary contract, both for the first job after unemployment and later jobs. The results show a small positive effect on the number of hours in the first job, and for the long run we find positive effects on the wage and number of working hours. The results from the two separate analyses suggest that even within the same country and institutional setting, the effects on job quality depend on the economic conditions or the group of workers affected by the entitlement reduction. The latter may also explain why there is no consensus in the literature about the effect of the UI entitlement period on job quality.

This paper proceeds as follows. In the next section we provide some theoretical background. In Section 3 we describe the Dutch UI system and the reform of October 2006. In Section 4 we present our data. We discuss the effects of reducing the entitlement period on job finding and other labor market outcomes in Sections 5 and 6, where we discuss the difference-in-differences and regression discontinuity approaches, respectively. In Section 7 we explore the underlying job finding mechanism. Our conclusions are presented in Section 8.

2. Job search theory and expected effects

Job search models describe the behavior of unemployed workers (e.g. Mortensen, 1986; Van den Berg, 1990). Each period the unemployed worker decides to which vacancies to send a job application. Each job application can result in a job offer. Whether or not such a job offer is acceptable for the unemployed worker depends on the characteristics of the job and the worker's labor market prospects. For ease of exposition theoretical models often impose that jobs are characterized by the wage. In our empirical analysis we also consider other job characteristics as measures for the quality of a job.

Job search theory assumes that unemployed workers maximize the present value of their lifetime utility, where utility is a function of income and leisure. When all jobs are full-time, the job offer acceptance decision is based on a reservation wage strategy. Each period the unemployed worker chooses a reservation wage and accepts a job offer if the associated wage exceeds the reservation wage in that period. Furthermore, in each period the unemployed worker determines the number of job applications such that the marginal costs of a job application equal the marginal returns.

The generosity of unemployment benefits plays a key role in job search decisions. If benefits are generous, either in level or length of the entitlement period, theory predicts that unemployed workers increase their reservation wage. Unemployed workers are thus more selective in which job offers to accept. If a worker accepts a job offer in a particular period, the wage – or more general job quality – will be higher if the job was found in a generous benefits system.

Increasing the reservation wage reduces the marginal benefits of search, which implies that the optimal number of job applications is lower. Therefore, a more generous unemployment benefits scheme reduces the job finding rate both because unemployed workers become more selective and because they search less intensively. These behavioral responses are referred to as moral hazard. Whereas being selective on job offers has the positive effect that the match between the worker and job improves which may have long-term consequences, the reduction in job applications only causes unemployment durations to become longer. At the same time, these longer unemployment durations can po-

[1] For example, Nekoei and Weber (2017), Lalive (2008), and Bennmarker et al. (2013) study unemployed workers at the 40, 50 and 55-year old threshold, respectively, while Schmieder et al. (2012) and Schmieder et al. (2016) study unemployed workers at the 42, 44 and 49-year threshold. Furthermore, Card et al. (2007) consider both extended severance payments for laid-off workers who have worked at least three years at their previous employer and the discontinuity in the entitlement period around the threshold of 36 months of employment in the previous five years.

tentially offset the positive effect on job quality, because of the reduced arrival of job offers and depreciation of skills. It is not clear which of these two countervailing forces prevails.

Van den Berg (1990) discusses a job search model taking account of limited entitlement to UI benefits. In the model the present value of being unemployed decreases with the unemployment duration since the remaining entitlement period to UI benefits decreases. Therefore, the reservation wage declines and unemployed workers increase their search effort. When individuals are forward looking, shortening the UI entitlement period already increases job finding rates at the moment of entering unemployment.

The standard theory predicts a smooth increase in job finding rates until UI benefits exhaustion. Several empirical studies show the existence of spikes in exit rates towards UI benefits exhaustion (e.g. Katz and Meyer, 1990; Meyer, 1990; Moffitt, 1985).[2] Most studies find that exit rates drop again after exhausting UI benefits. Various explanations for the existence of spikes are provided in the literature, such as former employers reemploying laid-off workers at the moment of UI benefits exhaustion (Katz and Meyer, 1990) or employers and unemployed workers agreeing to delay the starting date of a new job until UI benefits exhaustion (Boone and Van Ours, 2012). Focusing on spikes provides insight in job search behavior, but does not answer the policy relevant question how the length of benefits entitlement affects exit rates from unemployment. Answering this question requires exogenous variation in the entitlement period.

3. Institutional setting

In this section we first describe the Dutch UI system before the reform in October 2006, which is the period evaluated by the regression discontinuity design. Next, we describe the changes induced by the reform, which is analyzed using the difference-in-differences model.

3.1. Dutch UI system before october 2006

The Dutch UI law insures all employees against the risk of unemployment.[3] Entitlement to UI benefits requires that the worker loses at least five working hours, or 50% of her working hours if she works less than ten hours. The worker also has to satisfy the so-called *weeks condition* and *years condition*.[4] The weeks condition requires a worker to have worked at least 26 of the previous 39 weeks. The years condition states that the worker should have been employed for at least four out of the last five calendar years.

Workers satisfying both the weeks and the years condition were entitled to wage-related benefits equal to 70% of the last wage (capped at a maximum) for at least six months. The maximum duration of collecting UI benefits depends on the worker's labor market history, which is a function of age and actual employment. Because the UI administration does not have employment records before 1998, the labor market history before 1998 is equal to the age of the worker on January 1, 1998 minus 18. For the years after 1998, the labor market history consists of actual employment. For those years, a calendar year counts as employed if the worker worked at least 52 days in that year. If the worker had a labor market history of between five and ten years, the maximum length of the UI entitlement period was nine months. The maximum entitlement period increased with each interval of five additional years of labor market history up to five years. This step function of the maximum entitlement period will be exploited in the regression discontinuity analysis in combination with lack of records on the labor market history before 1998. When a UI benefits recipient leaves unemployment because of an accepted job but enters unemployment again within six months, the old UI spell is continued.

Table 1
Entitlement and level of UI benefits before and after the reform.

	Before reform	After reform
Short term UI		
When entitled	Worked 26 of last 39 weeks	Worked 26 of last 36 weeks
Level UI	70% of minimum wage	70–75% of last earned wage
Duration	6 months	3 months
Long term UI		
When entitled	Worked 26 of last 39 weeks Worked 4 out of 5 years	Worked 26 of last 36 weeks Worked 4 out of 5 years
Level UI	70% of last earned wage	70-75% of last earned wage
Duration	6-60 months	4-38 months

Note: The regression discontinuity analysis uses data before the reform and focuses on individuals close to the jumps in benefits entitlement. The difference-in-differences model is estimated on data before and after the reform. For both analysis we restrict the data to individuals entitled to long term UI and satisfying the stricter weeks condition after the reform.

Workers who are either not or no longer entitled to UI benefits, can apply for welfare benefits. Welfare is means tested and complements the household income to 50% of the minimum wage for a unlimited time period. Couples and single parents receive some additional benefits. Job search requirements are similar for all benefits programs, recipients have to make a job application at least once every week.[5]

3.2. UI reform in october 2006

The UI reform in October 2006 entailed four changes, which are summarized in Table 1. First, the weeks condition was tightened from having worked 26 of the previous 39 weeks to having worked 26 of the previous 36 weeks. Second, workers not satisfying the years condition (worked at least four of the past five years) are now entitled to short term UI with a level of 70% of their last wage instead of 70% of the minimum wage. Third, the replacement rate in the first two months of both short term and long term UI is now 75% of the last wage and afterwards 70% (both capped at the same maximum). Fourth, the length of the entitlement period to long term UI is reduced for almost all benefits recipients. The length of the entitlement period is now a linear function of labor market history, each additional year increased the UI entitlement period by one month.

We focus on the change in the entitlement period due to the reform in our difference-in-differences analysis. Therefore, we only consider individuals who are entitled to long term UI benefits and we only consider individuals who satisfy the slightly stricter weeks condition after the reform.[6]

Fig. 1 shows the entitlement to UI benefits before and after October 2006. The reform reduced the entitlement period most for individuals with long labor market histories. For workers with a labor market history of nine, 12, 18 and 24 years the entitlement period was unaffected by the reform, while workers with a labor market history of 13, 14 or 19 years were after the reform entitled to UI benefits for a longer period. In

[2] Within a standard job search model, some explanations have been given for the existence of spikes. For example, Mortensen (1977) explains the spike from an additional assumption that income and leisure are substitutes.

[3] The law excludes self-employed workers and some civil servants who have special arrangements.

[4] Workers satisfying the weeks condition, but not the years condition were entitled to short term UI for six months equal to 70% of the minimum wage or 70% of the last wage, whichever was lower.

[5] Whereas welfare benefits recipients have to accept all jobs, during the first year UI benefits recipients only have to accept jobs that match their skill and wage level.

[6] In Appendix A we consider individuals who entered UI just before and just after the reform with a labor market history such that the UI entitlement period remains the same. We find similar job finding probabilities for both groups which provides evidence that the increase in replacement rate during the first two month of UI does not affect job search behavior.

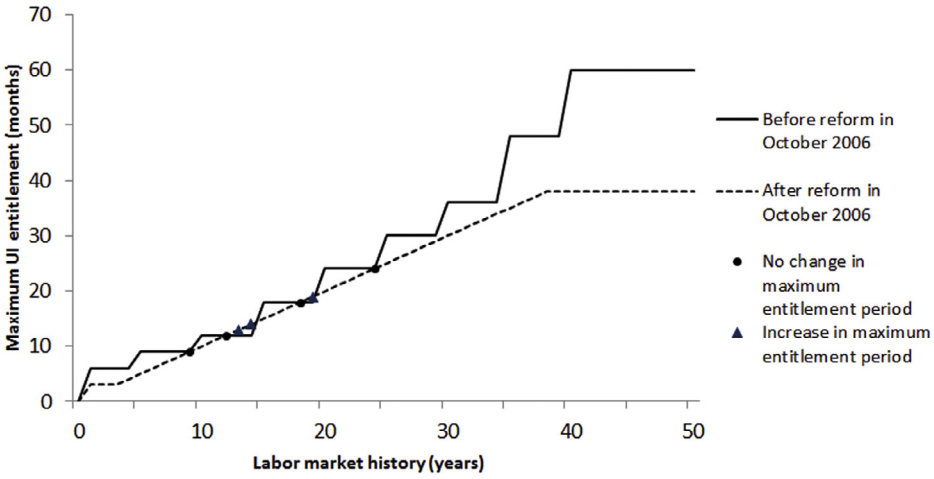

Fig. 1. Entitlement to UI benefits before and after the reform. Note: The regression discontinuity analysis exploits the jumps in the entitlement period before the reform. The difference-in-differences model uses the changes in entitlement period due to the reform.

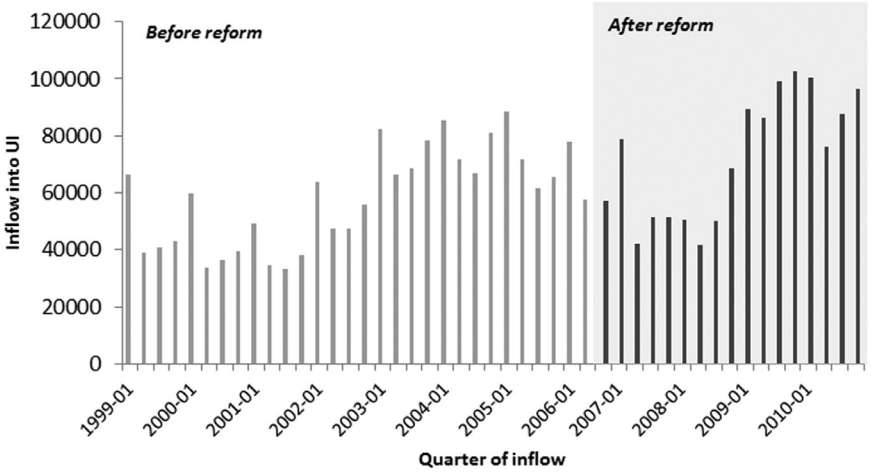

Fig. 2. Quarterly inflow into UI between 1999 and 2010.

the empirical analysis of the reform we exclude individuals with a labor market history of 13 and 14 years. Before the reform, the entitlement period of these individuals did not exceed 12 months, and, therefore, these individuals did not receive extensive active labor market policies. After the reform, the entitlement period of these individuals exceeds 12 months and they became exposed to a regime with more extensive active labor market policies.[7]

4. Description of the data

We use data provided by Statistics Netherlands that combine information from various administrations covering the period from 1999 to 2010. These data contain registrations at municipalities, the UI administration and the tax office, which include all payments of various types of benefits and information on jobs such as wages, working hours, type of contract (flexible or permanent), sector, etc. The data cover the full Dutch population. We select only those UI benefits spells that satisfy the years condition for collecting long-term UI benefits and the stricter weeks condition which was in place after the reform of October 2006.

We observe 1.8 million individuals who started collecting UI benefits at least once between 1999 and 2010 and they experience over 3 million UI spells. Fig. 2 shows the number of individuals entering UI for every three months. The figure shows that the inflow follows the business cycle closely and that there is no substantial change in the inflow around the reform in October 2006. From the end of 2008 onwards the inflow into UI increased substantially.

In the difference-in-differences analysis exploiting the UI reform we only consider individuals entering UI between July 1, 2004 and December 31, 2008. This provides an interval of 27 months both before and after the reform. The regression discontinuity analysis focuses on the jumps in the maximum UI entitlement period in the time period before the reform. Because the calculation of labor market histories was changed in January 2004, we use data from individuals entering between January 2004 and September 2006 for the regression discontinuity analysis. In this analysis, we focus on individuals born around the January 1, threshold, as the individuals age on January 1, may increase the labor market history with one year.[8] We discuss the identification strategy of the regression discontinuity design in detail in Section 6.

For each UI spell we observe daily information about the start and end date of collecting benefits, and the level of benefits. We use the age of the worker at January 1, 1998 and the actual employment history

[7] Our empirical results are not sensitive to excluding these individuals.

[8] In the data used for the regression discontinuity analysis we additionally exclude non-western immigrants who are often registered as being born on January 1, if their exact birthday is unknown and UI benefits spells that start within six months after the previous benefits spell ended.

Table 2
Descriptive statistics of UI spells starting before and after the reform.[a]

	July 2004–September 2006	October 2006–December 2008
UI eligibility characteristics		
Labor market history (years)	20.6	21.2
Potential UI entitlement before reform (months)	20.6	20.6
Actual UI entitlement (months)	20.6	16.7
Personal characteristics		
Female (%)	46.7	48.1
Age at start unemployment (years)	39.0	40.2
Couple (%)	63.3	62.1
Partner with income (%)	37.7	39.1
Single parent (%)	6.0	7.5
Children (%)	38.6	38.8
Immigrant (%)	19.7	21.1
Annual earnings before UI[b] (€)	34,103	33,091
UI duration and job finding		
Median UI duration (days)	166	92
Median duration until work (days)	152	119
Found work within one year (%)	66.9	68.3
Found work within three years (%)	82.8	80.3
Number of jobs within three years	4.1	4.1
Cumulative income		
Total UI benefits in three years after inflow[b] (€)	14,836	12,673
Total earned wage in three years after inflow[b] (€)	55,997	54,888
Job quality first job		
Annual earnings first job[b] (€)	21,172	22,348
Daily wage first job[b] (€)	94.50	107.69
Temporary contract in first job (%)	36.4	33.1
Working hours in first job (per week)	27.6	27.8
Number of spells	356,566	225,168

Note: The sample described in this table is used in the difference-in-differences analysis. The regression discontinuity analysis uses UI benefits spells starting between January 2004 and September 2006. [a] Statistics only include individuals entitled to long term UI benefits and satisfying the stricter weeks condition, which applies after the reform. [b] Calculated in price level of 2010.

since 1999 to construct the maximum entitlement period before and after October 2006.[9] We correct for re-entering UI using the institutional rules.

From the registration of municipalities we obtain demographic variables, which we merge with the labor market information. The demographic variables contain, for example, date of birth, gender, household composition, etc. This allows us to identify the partner for which we observe labor market outcomes as well. Recall that the partners' earnings determine whether someone will become eligible for welfare after UI (see Section 3). We construct a variable indicating potential eligibility for welfare benefits and a variable measuring the partners' earnings.

Once an individual stops collecting UI benefits, we know if this was due to exhaustion of UI benefits. In that case we observe whether or not the individual starts collecting welfare benefits. Otherwise we observe subsequent labor market outcomes, e.g. earnings, working hours and type of contract. We observe this information for each job.

Table 2 shows descriptive statistics for the total UI inflow before and after the reform, which is used in the difference-in-differences analysis.[10] Before the reform individuals had, on average, a labor market history of slightly less than 21 years. Individuals who entered UI after the reform had a labor market history of roughly 0.6 years longer. If the institutional rules from before the reform would apply the entitlement to UI benefits would, on average, be 20.6 months for both individuals before and after the reform. The reform reduced the average UI entitlement period with almost four months to 16.7 months. We observe some differences in the composition of the total group of workers entering UI before and after the reform. After the reform, we observe more women, a higher average age, more individuals who have a partner with an income above the welfare threshold, more immigrants and more single parents. The regression discontinuity analysis does not exploit the reform and in Subsection 6.2 we provide evidence that the composition of workers is balanced around the relevant thresholds. In the next section we show that the results of the difference-in-differences analysis are robust against controlling for individual characteristics.

The third panel of Table 2 shows the mean UI duration and average job finding probabilities before and after the reform. Compared to individuals who entered before the reform, we observe a large reduction in both the mean UI duration and the median duration until finding work for individuals who entered after the reform. The percentage of unemployed workers who found work within one year after entering unemployment increased with, on average, 1.4 percentage points, while the percentage of workers who found work within three years decreased with about 2.5 percentage points. Both individuals who entered before and after the reform have, on average, 4.1 jobs within the three years after entering unemployment.

The fourth panel considers the cumulative income in the three years after inflow into UI. Given the decrease in the median UI duration, it is not surprising that the average UI benefits decreased with over € 2000. The average cumulative earned wage is roughly € 1000 lower for individuals who entered after the reform. The characteristics of the first job after unemployment are given in the last panel. By construction, these statistics only include individuals who found a job within three years

[9] We do not observe employment in 1998 while the UI administration does observe actual employment for this year. We count 1998 as an employed year if the worker was at least 18 years old in 1998 and employed in 1999.

[10] The pre-reform data largely coincide with the data used in the regression discontinuity analysis. The regression discontinuity analysis only focuses on the period from January 2004 until September 2006 and excludes non-western immigrants from the data. Observed characteristics are balanced around the thresholds. Therefore, we do not provide separate summary statistics for this sample and postpone a more detailed discussion to Section 6.

after UI inflow. Both the annual earnings and the daily wage have increased after the reform. After the reform, fewer unemployed workers accept a temporary contract while the number of working hours slightly increases.

Appendix B provides some additional figures with data description. These figures provide descriptive evidence that a longer UI entitlement period is associated with reduced job finding, but that the difference slowly vanishes after the entitlement period ends. Furthermore, individuals with a longer UI entitlement period have higher accepted wages in the first job. These accepted wages decline faster as the UI period progresses for individuals with long UI entitlement. These patterns may be explained by the entitlement period, but can also reflect differences in age and employment history.

5. Difference-in-differences analysis

Job search theory predicts that after reducing the generosity of a benefits scheme unemployed workers lower their reservation wage and increase their search effort. A reduction in the entitlement period to UI benefits then reduces the expected length of an unemployment spell and decreases the subsequent job quality. In this section, we test these hypotheses empirically using a difference-in-differences model that exploits the reform in October 2006.

5.1. The model

We specify a regression model to estimate the effects of reducing the UI entitlement period on various labor market outcomes Y_{it} of individual i who started collecting UI benefits at calendar time t

$$Y_{it} = \alpha + \delta D_{it} + \sum_h \gamma_h \mathbb{1}\{H_{it} = h\} + X_{it}\beta + \mu_t + \epsilon_{it} \quad (1)$$

The variable D describes the change (in months) in the UI entitlement period due to the reform. Prior to October 2006, the variable D always equals zero. We construct D such that if the reform reduces UI entitlement with six months, D takes value six. For about 88% of the entrants in UI after October 2006, the UI entitlement period is shorter than it would have been before the reform, thus for those individuals $D > 0$. The parameter of interest δ should be interpreted as, for example, the increase in exit probability due to reducing the entitlement period with one month.

The entitlement period to UI benefits is determined by the labor market history. We include fixed effects γ_h for all possible values of the labor market history H. As D depends on the labor market history, including these fixed effects controls for the endogeneity of D. The vector X contains several worker characteristics which capture both personal characteristics, UI history and characteristics of the last job before UI. With respect to the UI history, X contains a variable indicating if the worker returned to UI within six months and resumes the previous UI spell. In that case, X also contains a variable describing the previous elapsed UI duration, which takes the value zero in the absence of a previous UI spell. Other variables we include in X are gender, household composition, ethnicity, whether or not someone collected UI in the three years before, whether someone had a part-time job at the moment of UI inflow, earnings before entering UI, and sector.[11] The time trend μ is specified using dummy variables for each quarter of inflow in UI. This controls for calendar time variation in job finding probabilities, for example, due to business cycle variation or seasonality.

Our empirical model is a difference-in-differences model. Recall from Section 3 that for some labor market histories the reform did not affect the maximum entitlement period to UI benefits. More specifically, individuals with a labor market history of nine, 12, 18 and 24 years were not affected by the reform and they form the control group which identifies the time trend μ. The treatment group consists of all individuals for whom the maximum entitlement period would have been affected by the reform, thus individuals with a labor market history different from nine, 12, 18 or 24 years, where for those entering after the reform $D \neq 0$. Within the treatment group D varies between −2 and 22. The fixed effects for the labor market histories control for differences in exit rates between individuals with different labor market histories. The identification of the effect of a change in the UI entitlement period D hinges on a common trend between individuals with different labor market histories.

We test the common trend assumption in two ways. First, we graphically explore the trend in labor market outcomes Y before and after the reform, where we distinguish between the control group and treatment group. Fig. 3 shows these trends for finding work within 12 months and cumulative earnings within three years after inflow UI.[12] Although the level of both the job finding probability and the cumulative earnings is lower for the treatment group, the trends prior to the reform look similar and the difference between the treatment and control group appears stable. The same holds for other outcome measures. For cohorts after the reform, the difference in job finding probabilities somewhat decreases, while we do not observe a change in the difference in cumulative earnings.

We test the common trend assumption more formally by estimating the regression model in Eq. (1) for all labor market outcomes, but using only the subsample of individuals who entered UI one year before the reform. We include a placebo treatment variable, which supposes that the reform occurred in March 2006 instead of October 2006 and substitute D by the difference in months of UI entitlement if the individual would have been affected by the reform. D is zero for individuals who entered between October 2005 en March 2006.[13] We find that three of the 17 estimated placebo treatment effects are significant. However, job finding within 36 months and number of jobs within three years are strongly correlated and we find opposite signs for finding work within six months and within 36 months. Given the graphical evidence and that we find no effects on finding work within three, 12 and 24 months and on all variables describing wages, hours, contracts, income, earnings, benefits, etc., we do not worry too much about the three significant coefficients and conclude that there is a common trend in outcome variables of the treatment and control group.

5.2. Difference-in-differences estimated effects of reducing UI entitlement

Table 3 presents the estimated effects of reducing the UI entitlement period on various outcome measures for finding work, earnings, benefit receipt and job characteristics. Each estimate in the table represents the estimated coefficient of the reduction in months for separate regressions using the difference-in-differences model. In each row, we also report the mean outcome before the reform. The table shows that the estimated effects from a model specification with and without controlling for some observed individual characteristics are very similar. Controlling for individual characteristics only causes a modest change in the estimated effect of the wage and working hours in the first job. We interpret this as evidence that there are no compositional changes in the inflow in UI due to the reform, but that there may be some (dynamic) selection in job finding. Below we focus on the estimated effects controlling for individual characteristics.

The first panel considers finding work. The outcome variables take value one if someone finds work within three, six, 12 or 24 or 36 months, respectively.[14] Reducing the UI entitlement period has no effect on the

[11] Including these control variables does not affect the estimated effects of the reduction in UI entitlement.

[12] Appendix C contains the same figures for UI benefits receipt and temporary work.

[13] The estimated placebo effects are shown in Table C1 in Appendix C.

[14] If an individual finds work after UI exhaustion, this is included in the outcome variables as well.

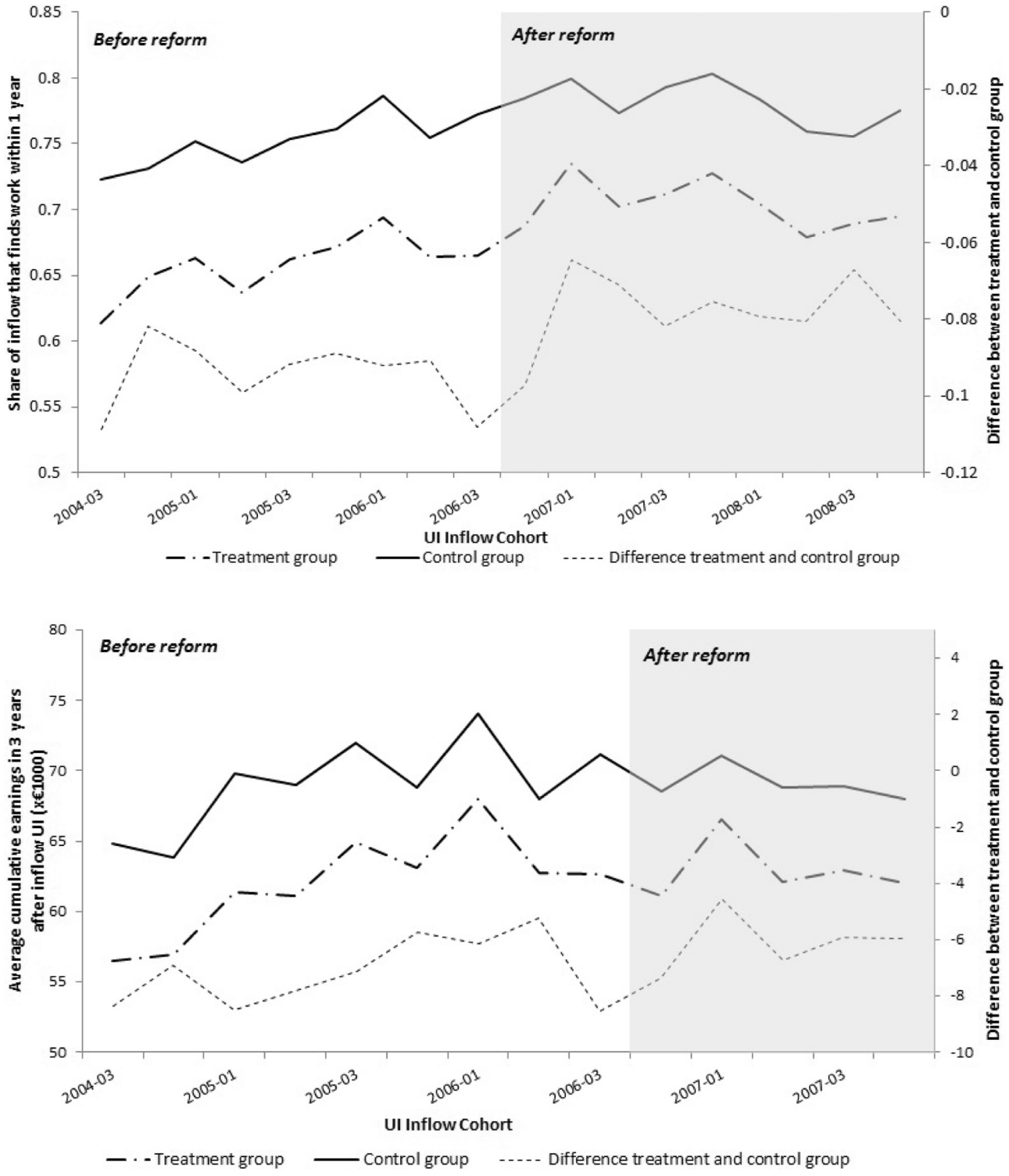

Fig. 3. Job finding probability within one year and cumulative earnings within three years by inflow cohort. Note: Individuals in the treatment group would experience a change in the UI entitlement period if they entered after the reform in October 2006. Individuals in the control group have the same entitlement period regardless of their moment of inflow (i.e. individuals with a labor market history of nine, 12, 18 of 24 years).

probability of finding work within three months, but the effects are significant for longer observation periods. The reform reduced the UI entitlement period with, on average, four months. Therefore, due to the reform the probability of finding work within six months after entering UI increased with about $4 \times 0.0013 \approx 0.005$. The effects of the reform increase as we consider a longer time window, the job finding probabilities within two and three years increase with about 0.016. This is quite substantial if we take into account that before the reform 78% of the individuals found work within two years and during the third year after inflow only five percent of all individuals find work. So, the reform induced some individuals to find work, who would otherwise be at risk of being unemployed for a long period. However, our estimated effects are relatively small compared to, for example, the effects found by Van Ours and Vodopivec (2006), and the reduced UI entitlement period

Table 3
Estimated effects of reducing the UI entitlement period using the difference-in-differences model.

	(1)		(2)		Mean
Job finding probabilities					
Finding work within 3 months	−0.0003	(0.0004)	−0.0005	(0.0004)	0.28
Finding work within 6 months	0.0017***	(0.0004)	0.0013***	(0.0004)	0.49
Finding work within 12 months	0.0031***	(0.0004)	0.0028***	(0.0004)	0.67
Finding work within 24 months	0.0043***	(0.0004)	0.0040***	(0.0004)	0.78
Finding work within 36 months	0.0041***	(0.0004)	0.0038***	(0.0004)	0.83
Cumulative income, three years					
Total UI benefits	−113.08***	(28.45)	−107.49***	(24.97)	14,836
Total earnings	255.58***	(56.71)	226.48***	(50.10)	55,997
Total income	140.22***	(51.99)	119.28***	(41.22)	72,052
Cumulative number of jobs, three years					
Number of jobs	0.0197***	(0.0025)	0.0180***	(0.0023)	3.85
Job quality, first job					
Finding a job	0.0037***	(0.0004)	0.0034**	(0.0004)	0.82
Daily wage	−0.078	(0.092)	−0.161*	(0.084)	101.08
Working hours	0.0269**	(0.0110)	0.0129	(0.0094)	27.55
Temporary contract	0.0022***	(0.0004)	0.0022***	(0.0004)	0.36
Job quality, after 3 years					
Having a job	0.0037***	(0.0005)	0.0036**	(0.0004)	0.65
Daily wage	−0.062	(0.125)	−0.106	(0.104)	119.47
Working hours	0.0252*	(0.0143)	0.0207*	(0.0120)	32.17
Temporary contract	−0.0011**	(0.0004)	−0.0011***	(0.0004)	0.17
Calendar time fixed effects		Yes		Yes	
Labor market history fixed effects		Yes		Yes	
Individual characteristics		No		Yes	

Note: Each row and column represents a separate regression. Standard errors (in parentheses) are clustered at the level of region and quarter of inflow. * significant at a level of 10%, ** significant at a level of 5%, *** significant at a level of 1%.

can not explain the total observed increase in job finding rates after the reform.

The second panel of Table 3 presents the effects of the UI entitlement period on the cumulative income three years after entering UI. We consider income from UI benefits, earned wages and the sum of UI benefits, earned wage and welfare benefits (defined as total income). Shortening the UI entitlement period with one month reduces, on average, total UI benefits payments within three years after inflow with about 107 euros. Expressed as a percentage of the average UI benefits payment these savings are 0.7%. At the same time, the reduction increases the cumulative earned wage with about 226 euros. The negative effect on UI benefits is offset by the positive effect on wages and a one month reduction increases the total income by 119 euros.

The effects of reducing the UI entitlement period on the number of jobs within three years are given in the third panel of Table 3. After reducing the UI entitlement period, workers tend to find more jobs within the first three years after entering UI. This can be due to increased job finding in general, but it can also be a signal for reduced job quality as workers move to better jobs.

Next, we consider job quality in more detail. Job search theory predicts that when the benefits system is less generous, unemployed workers reduce their job demands. Therefore, in the fourth panel we consider as outcomes characteristics of the first job after unemployment. These job characteristics are only observed for the possibly selective sample of workers who find work within the observation period. Such dynamic selection may bias the estimated effects, because the reform increased job finding rates. To get some idea about the size of this potential bias, we estimate the effect of a one month reduction of the UI entitlement period on the probability of having any job at all in the observed time window. The estimated effect implies that the average four months reduction in UI entitlement due to the reform increased job finding from 82.3% to 83.6%. The effect is significant but given the high job finding rate, the selection bias will be modest. This is confirmed by the fact that pre-unemployment wages of those individuals who are observed to have found work are unaffected by the reform.

We find a small negative effect on the daily wage in the first job. Because the reform reduced the UI entitlement period with about four months, individuals affected by the reform, on average, earn 64 cents per day less in their first job, which is about 0.63% of the average daily wage. This is in line with earlier literature that finds at most a small negative effect of a UI reduction on earnings. Centeno and Novo (2009), Cockx and Picchio (2013) and Nekoei and Weber (2017) find a small positive effect of an extension of the entitlement period while Lalive (2007) and Card et al. (2007) do not find any effect and Schmieder et al. (2016) find a negative effect. From our results we can draw two conclusions. First, the effect of reduced skill depreciation due to increased job finding on wages is smaller than the reduced reservation wage path. Second, the increased job finding dominates the small decline in wages when considering cumulative earnings. These results suggest that individuals experience some disutility from starting working. Individuals often have a temporary contract in their first job, which is considered as a negative signal about job quality and it provides less security than a permanent contract.[15]

In the final panel we present the effects on the quality of the job three years after inflow UI. Here we only consider workers who have a job three years after inflow, which is the case for about two-thirds of the individuals. The reform increased the probability of having a job after three years by, on average, 1.4 percentage points, which means that we can not rule out that our job quality estimates are subject to dynamic selection bias. In addition, we find that the pre-unemployment wage of post-reform workers who are employed after three years is, on average, 3% lower than the pre-unemployment wage of employed pre-reform workers, which indicates that those employed after the reform, on average, have less favorable characteristics.

[15] Boone and Van Ours (2012) find that the spikes around exhaustion of UI benefits are larger for permanent jobs than for temporary jobs and regard this as evidence that spikes occur because unemployed workers delay their starting date of a new job until the moment of exhaustion of UI benefits.

Our results do not show a significant effect on wages and a small and only marginally significant effect on working hours. The estimated effect on having a job with a temporary contract is negative. Combined with the increased job finding this implies that the reform causes that three years after entering UI more workers manage to obtain a job with a permanent contract. Our preferred explanation is that the reform stimulates more individuals to find work quickly. First jobs are often temporary jobs and, therefore, average job turnover is high and a substantial share of the individuals lose their job again. However, the increased job finding eventually causes more individuals to have a job with a permanent contract after three years. These jobs are associated with higher wages, which explains the average wage growth between the first job and the job after three years.

5.3. Robustness check and heterogeneous effects

To separate the effects of the reduced UI entitlement period from calendar time effects, we exploit that the entitlement period did not change for individuals with a labor market history of nine, 12, 18 and 24 years. For individuals with longer labor market histories, e.g. more than 35 years, the control group may be less appropriate. Therefore, we repeat the regressions for a sample of unemployed workers with a labor market history shorter than 35 years. The results provided in Table D1 in the Appendix D show larger effects of reducing the entitlement period for job finding within six and 12 months, while the effects are smaller on job finding within 24 months and zero on job finding within 36 months. The results when restricted the sample to individuals with shorter entitlement periods, suggests that the effect on job finding only exists during the actual entitlement period, and not in the period afterwards. We provide more evidence on this in Section 7. The results on the other outcomes are quite robust when restricting the sample, only the effect on the daily wage becomes positive and significant. This may suggest that the positive effect of less skill depreciation and more job opportunities outweighs the negative effect of being less selective in accepting a job.

In the previous subsection we provided the average effect of reducing the UI entitlement period. We test whether responses differ by subgroup by estimating our models on different subsamples stratified by gender and age. In addition, we consider heterogeneous effects by level of benefits and entitlement to welfare benefits after exhausting UI. The group with low levels of UI benefits and potential entitlement to welfare benefits is of special interest because these workers do not have to face an income drop when exhausting UI benefits. Standard job search theory predicts that for this group the effects of a reduction of the UI entitlement period are limited, in particular since UI and welfare impose the same job search requirements on benefits recipients.

We do not find substantial differences in the effects between men and women and also the benefits level and potential entitlement to welfare benefits hardly affect the estimated effect.[16] The latter does not coincide with job search theory, but can be explained by the low take-up rate of welfare benefits. In our data only 48% of the unemployed workers who become eligible for welfare actually start collecting these benefits.

Our estimation results indicate that young workers (under the age of 35) respond less strongly to changes in the UI entitlement period. The previous literature often exploits age thresholds between age 40 and 55. According to our results this describes the population which is most responsive to the UI entitlement period. We do not find different effects for individuals between age 40 and 55 and individuals older than 55. The latter indicates that also older workers who may be close to retirement or leaving the labor market otherwise change their job search behavior in response to changes in the UI entitlement period.

6. Regression discontinuity design

Before the reform in October 2006, the length of the UI entitlement period was a stepwise function of labor market history (see Fig. 1). We use a regression discontinuity design to exploit the jumps in the entitlement period to obtain additional estimates of the effect of the UI entitlement period.

6.1. The model

Exploiting the thresholds for labor market years where the UI entitlement period increases would be an obvious choice for a regression discontinuity analysis. However, labor market years are discrete, and we only observe four years before and after each threshold. Such a regression discontinuity analysis can be based on at most two years before and two years after the threshold, which makes it difficult to estimate the coefficient of the running variable. In addition, we find significant discontinuities in observable characteristics at the thresholds. Recall that the labor market history is a function of age and employment years, where employment years equals the number of years in which the worker worked at least 52 days since 1998. Since only few individuals work less than 52 days a year, the 52-days threshold does not give enough statistical power (and it can be manipulated by choosing the lay-off date).

We focus the regression discontinuity analysis on the age. Because the UI administration does not have records of employment histories before 1998, the labor market history concerning years before 1998 equals the age on January 1, 1998 minus 18. We observe month of birth, which we exploit to identify the effect of a longer entitlement period. More specifically, we compare, for example, two individuals who both entered UI in January 2005 and were both employed for all the years between 1998 and 2004, but individual A was born in January 1977 and individual B was born in December 1976. Individual A is, therefore, entitled to nine months and individual B is entitled to 12 months of UI benefits.

We specify the regression model which pools all thresholds indicated by s:

$$Y_{its} = \alpha_s + \delta D_{its} + \kappa M_i + \lambda M_i \mathbb{1}\{M_i \geq 0\} + \beta E_{it} + \mu_t + \epsilon_{its} \quad (2)$$

D indicates the drop in UI entitlement at the threshold. So this variable equals zero for individuals born in December or earlier and the difference (in months) in the UI entitlement period for individuals born in January or later. The parameter δ has the same interpretation as in the difference-in-differences model and describes how a one month reduction in UI entitlement affects the outcome Y. The variable M describes the number of months from a threshold where the entitlement is increased.[17] The regression model is specified as a local linear model and we prefer a bandwidth of 24 months around the thresholds. As a robustness check we also consider bandwidths of 12 and 30 months around the threshold and a local quadratic model with a bandwidth of 24 months. In all regressions, we control for the observed number of employed years since 1998 denoted by E and fixed effects for the quarter of inflow μ_t and the thresholds α_s.

Recall from Section 4 for estimating the regression discontinuity model we use data on workers entering UI between January 2004 and September 2006. We exclude immigrants from the analysis because for some immigrants the exact month of birth is unknown and in such cases the month of birth is registered as January. Finally, we exclude the thresholds at 12 and 24 months of UI entitlement, because unemployed workers with more than 12 or 24 months of UI entitlement are more likely to participate in more intensive active labor market programs.

[16] All estimation results can be found in Tables D2–D4 in Appendix D.

[17] Being born in January implies that $M = -1$, being born in December gives $M = 0$, being born in November implies $M = 1$, etc.

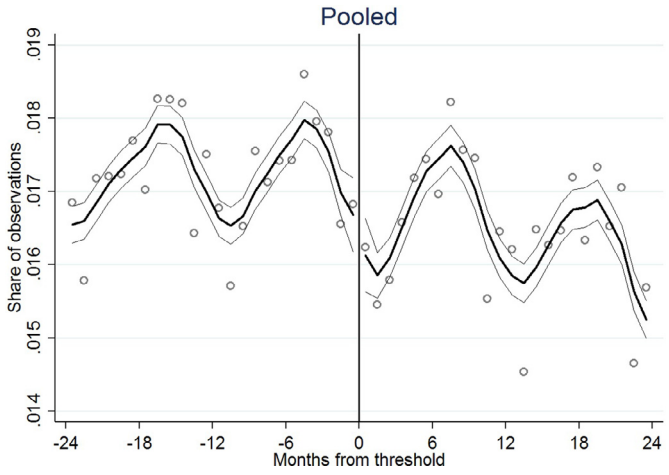

Fig. 4. Density of observations around the threshold where the UI entitlement period increases, pooled. Note: Pre-reform period, January 2004-September 2006. At month 0 (December), the entitlement period increases. Observations around the thresholds of 12 to 18 months and 24 to 30 months are excluded.

Table 4
Estimates of McCrary test for discontinuities around the thresholds.

	Coefficient	Standard error
Pooled	−0.014	(0.032)
9 to 12 months	0.073	(0.064)
18 to 24 months	−0.073	(0.065)
30 to 36 months	0.022	(0.072)
36 to 48 months	−0.120	(0.075)
48 to 60 months	0.018	(0.081)

Note: Each row in the table represents a separate regression. Bandwidth around the threshold of 3 months. * significant at a level of 10%, ** significant at a level of 5%, *** significant at a level of 1%.

6.2. Testing the validity of the regression discontinuity design

To test the validity of our regression discontinuity design, we perform three tests. First, we test if around the threshold the distribution of entry in UI is continuous. Fig. 4 does not provide evidence that individuals with longer UI entitlement (right of the threshold) are more likely to enter UI. In Table 4 we show the results of the test proposed by McCrary (2008). The results do not provide evidence for discontinuities in the densities around the different thresholds, also not when pooling all thresholds.

Second, we test for discontinuities in observed characteristics around the thresholds. In Fig. 5 we plot the average age at inflow into UI and the annual pre-unemployment wage, by length of the labor market history. We observe a smooth distribution of both individual characteristics around all thresholds.[18] A formal test for discontinuities in observed characteristics around the threshold shows only a significant jump for having children in the threshold (out of 11 different characteristics).[19] The estimated jump for children is, however, small and the results of our regression discontinuity estimation are not sensitive to including having children as covariate (and also not to including other covariates).

Our third test for the validity of the regression discontinuity design focuses on discontinuities around placebo thresholds two years from the actual thresholds where the UI entitlement period increases (i.e. around

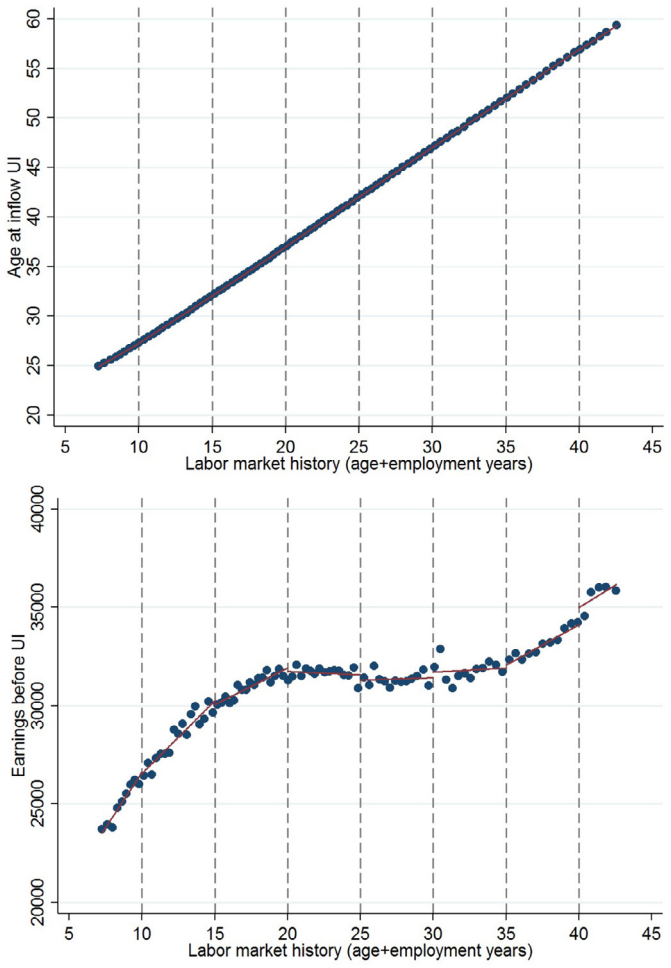

Fig. 5. Average age at inflow into UI (upper panel) and average annual wage before inflow into UI (lower panel), by length of the labor market history. Note: Pre-reform period, January 2004–September 2006. The solid lines represent linear fits for every interval between thresholds where the UI entitlement period increases. The vertical dashed lines denote the labor market history where the UI entitlement period increases..

12, 17, 22, 27, 32 and 37 labor market years). We estimate a local linear specification with a bandwidth of 24 months around the placebo thresholds, controlling for calendar time and actual employment years. We do not observe any discontinuities in the job finding rate within 12 months, cumulative UI benefits, earnings and number of jobs within three years. Out of 25 outcome variables, only two placebo effects are significant at the 10% level.[20] Because pure chance predicts about the same number of (marginally) significant placebo effects, we interpret these results as evidence for the validity of our regression discontinuity design.

6.3. Regression discontinuity estimates for the effects of reducing UI entitlement

In this subsection we discuss the results of the regression discontinuity estimation of the effects of reducing UI entitlement.

Fig. 6 shows graphical evidence for four outcomes where we pool all thresholds.[21] We observe a jump in the probability of finding work within 12 months. This increased job finding causes that total UI benefits payment within three years after entering unemployment declines. The jump in cumulative earnings has about the same size as the jump in

[18] Fig. E1 in the Appendix E shows that the distributions of other covariates are also smooth around the thresholds.
[19] See Table E1 in Appendix E for the estimation results.
[20] All results can be found in Fig. E2 and Table E2 in Appendix E.
[21] The same graphs for other outcomes are in Fig. F1 in Appendix F.

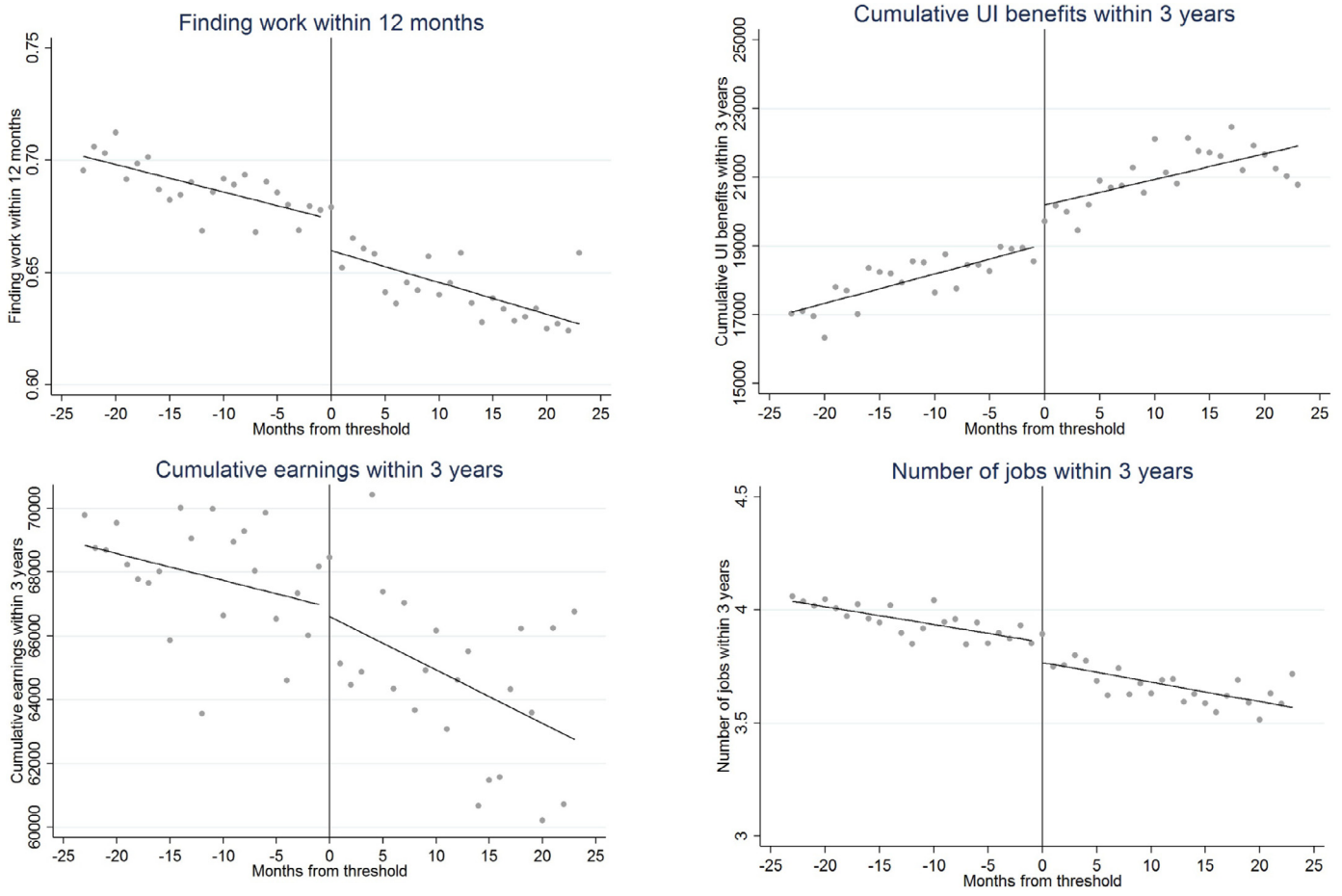

Fig. 6. Outcomes around the thresholds where UI entitlement increases, pooled. Note: Average probability to find a job within 12 months (left upper panel) and cumulative UI benefits right upper panel), cumulative earnings (left lower panel) and number of jobs (right lower panel) within three years after inflow into UI. Pre-reform period, January 2004-September 2006. Observations around the 12–18 months and 24–30 months thresholds are excluded.

UI benefits, but is less pronounced since earnings are much more noisy than benefits payments. The final graph shows that reducing the UI entitlement period causes individuals to have more jobs in the three years after entering unemployment.

The estimation results of the pooled regression discontinuity analysis are given in Table 5. Since the regression discontinuity design exploits jumps in the UI entitlement period before the reform, we have a longer observation period than in the difference-in-differences analysis and can report effects up to five years after starting collecting UI. The first panel shows the effects on job finding. The estimated effects from regression discontinuity estimation are almost identical to the results of the difference-in-differences analysis in Table 3, only the effect on job finding within three years is slightly larger. The second and third panel consider cumulative income within three and five years after UI inflow. We find that a reduction in the UI entitlement period decreases the cumulative UI benefits and increases the cumulative earnings. This result is very similar to the difference-in-differences estimates, only the point estimates in the regression discontinuity analysis are larger. The regression discontinuity design thus also shows a positive effect on total income, but this is insignificant due to a large standard error. The effects on UI benefits and earnings increase when considering the longer time window of five years. In particular, after five years a one month reduction in UI entitlement decreases cumulative UI benefits by €459 and increases cumulative earnings by €719. The same pattern is observed in the fourth panel, where the effect on the number of jobs is slightly higher after five years than after three years.

The last three panels show the results on the quality of the first job and the jobs after three and five years. In contrast to the results of the difference-in-differences analysis, we do not find evidence of lower quality of the first job in terms of lower wages or more temporary contracts. The regression discontinuity estimates show a small positive effect on the working hours of the first job and no effects on job quality after three years. However, a shorter UI entitlement period does increase the daily wage and the number of working hours of the job after five years.

We can exploit the jump in the UI entitlement period at each threshold separately. Job search theory predicts that effects are largest for unemployed workers with short entitlement periods. This is confirmed by our empirical results.[22] If we look at the effects on job finding within one year, the results are largest when the UI entitlement period is reduced from 12 to nine months. If we consider longer periods, we find a significant effect on job finding within 18 months at the 18 to 24 months threshold and a significant effect on job finding within 60 months at the 48–60 months threshold. This indicates that the increased job finding due to a shorter entitlement period occurs at the end of the reduced entitlement period. We further investigate this in the next section.

To test the sensitivity of the estimation results with respect to the model specification, we first replace the local linear trend in birth month with a quadratic specification. Most estimated coefficients are slightly smaller, but differences are most often not significant. As a second test we vary the bandwidth around the thresholds from 24 months to 12 and

[22] The estimation results are in Table F1 in Appendix F.

Table 5
Regression discontinuity estimates of the effects of reducing the UI entitlement period.

	Coefficient	Standard error	Mean
Effects on job finding			
Finding work within 6 months	0.0018***	(0.0006)	0.47
Finding work within 12 months	0.0031***	(0.0005)	0.66
Finding work within 24 months	0.0039***	(0.0005)	0.77
Finding work within 36 months	0.0050***	(0.0005)	0.82
Finding work within 60 months	0.0056***	(0.0005)	0.83
Effects on cumulative income, 3 years			
Total UI benefits	−249***	(32)	19,539
Total earnings	323***	(107)	66,296
Total income	72	(105)	86,194
Effects on cumulative income, 5 years			
Total UI benefits	−459***	(49)	21,678
Total earnings	719***	(175)	114,294
Total income	259	(178)	136,761
Effects on cumulative number of jobs			
Number of jobs, 3 years	0.0185***	(0.0028)	3.81
Number of jobs, 5 years	0.0339***	(0.0043)	5.73
Effects on job quality, first job			
Finding a job	0.0041***	(0.0006)	0.89
Daily wage	0.07	(0.14)	113.44
Working hours	0.031*	(0.016)	28.4
Temporary contract	−0.0005	(0.0006)	0.28
Effects on job quality, after 3 years			
Having a job	0.0046***	(0.0006)	0.65
Daily wage	0.04	(0.16)	133.15
Working hours	0.023	(0.017)	32.5
Temporary contract	0.000	(0.001)	0.12
Effects on job quality, after 5 years			
Having a job	0.0034***	(0.0005)	0.45
Daily wage	0.41**	(0.19)	137.83
Working hours	0.044**	(0.022)	32.4
Temporary contract	-0.001	(0.001)	0.09

Note: Each cell in the table represents a separate regression. All regressions are estimated using a local linear specification with a bandwidth of 24 months around the thresholds and include calendar time fixed effects and actual employment history (after 1998) fixed effects as controls. Standard errors are clustered at the level of region and quarter of inflow. * significant at a level of 10%, ** significant at a level of 5%, *** significant at a level of 1%.

30 months. Reducing the bandwidth to 12 months again slightly reduced the estimated effects, while increasing the bandwidth to 30 months has no effect on the estimated effects.[23] Changing the model specification thus does not change our conclusions about the effects of reducing the maximum UI entitlement period. Therefore, we conclude that the regression discontinuity estimates are robust against changing the model specification.

6.4. Comparing estimated effects from regression discontinuity and difference-in-differences

The difference-in-differences analysis and the regression discontinuity design show very similar results on job finding, benefits payment and earnings. However, the difference-in-differences estimates show that reducing the UI entitlement period decreases the quality of the first job, while regression discontinuity shows a small positive effect on job quality. In this subsection we discuss these differences.

There can be several reasons why regression discontinuity gives different results on job quality than the difference-in-differences analysis. Estimated effects for job quality may suffer from dynamic selection bias due the fact that we only observed a first job for the selective sample of unemployed workers who finds work within the observation period. Indeed, these estimated effects are less robust against including individual characteristics. It may be that the dynamic selection differs between the regression discontinuity design and the difference-in-differences analysis, causing a different bias in both estimated effects. Two reasons why dynamic selection may differ are that the sample affected by the reform differs from the sample affected by the thresholds, and both methods study a different observation period with also a different length.

The difference-in-differences approach considers the reform of October 2006, while the regression discontinuity design exploits discontinuities in the period before the reform. Recall that reducing the UI entitlement period reduces reservation wages and increases job search effort. This causes unemployed workers to be less selective in which job offer to accept, but also loose fewer skills during unemployment. The regression discontinuity design focuses on a period of increasing unemployment rates, while the difference-in-differences analysis consider a period of decreasing unemployment rates. In economic downturn it may be more important to find work fast and the consequences of skill depreciation may be larger when more unemployed workers compete for fewer jobs. In periods of economic growth job opportunities may decline at a slower rate when being unemployed.

Regression discontinuity and difference-in-differences both estimate a weighted average of marginal treatment effects. However, the thresholds in the regression discontinuity design provide identification for different groups of workers than the reform considered in the difference-in-differences approach, and both thus apply different weights to the marginal treatment effects. In our regression discontinuity design no effect can be identified for groups of workers who respond relatively strongly in the difference-in-differences analysis, i.e. immigrants and unemployed workers around the 12–18 and 24–30 months thresholds. Finally, recall that where the literature always finds that reducing the UI entitlement period stimulates job finding, there is no consensus on the effects on the worker-job match. Our result that the estimated effects differ between identification strategies, the data and the time periods is consistent with the literature.

7. Modeling job finding

In the previous sections we showed that reducing the maximum UI entitlement period increases the probability of finding work. In this section we explore the underlying dynamics in job finding during the unemployment spell using a hazard rate model. This model describes exit to work after τ periods of unemployment for an individual who enters UI at calendar time t with an observed UI entitlement max UI, labor market history H and other observed characteristics X,

$$\theta(\tau|t, H, X) = \lambda(\tau)\phi(\max UI - \tau)\varphi(\max UI, t, X, H) \quad (3)$$

where $\lambda(\tau)$ denotes duration dependence in job finding. Our function of interest, $\phi(\max UI - \tau)$, describes how the job finding rate is affected by the remaining entitlement period after τ days of unemployment. We specify $\phi(\max UI - \tau)$ as a piecewise constant function. In the function $\varphi(\max UI, t, H, X)$, we allow the length of UI entitlement to have a constant effect on job finding from the start of unemployment. To account for endogeneity of the UI entitlement period we include calendar time indicators and fixed effects for the labor market history H. Finally, we include the same covariates X as in the regressions discussed in Section 5. We use Cox partial likelihood method to estimate the hazard rate, thereby leaving $\lambda(\tau)$ unspecified.

Given that we restrict the model to a proportional specification, the identification of the causal effects of UI entitlement is similar as in the difference-in-differences model specified in Section 5. The control group of individuals who are not affected by the reform identifies the calendar time effects. The labor market histories H control for differences between individuals with different employment histories or age, and the effects of the UI entitlement period are identified from interactions between calendar time and labor market histories. This identification

[23] Tables F2 and F3 in Appendix F show the estimation results for both robustness checks.

Table 6
Estimated effects of the UI entitlement period from a hazard rate model for finding work.

	Coefficient	Standard error
UI entitlement (in months)	-0.010***	(0.002)
Time until/after exhaustion		
More than 6 months after exhaustion	−0.201***	(0.013)
3–6 months after exhaustion	0.021	(0.013)
1–3 months after exhaustion	0.113***	(0.012)
First month after exhaustion	0.240***	(0.013)
Last month until exhaustion	0.239***	(0.011)
1–3 months until exhaustion	0.140***	(0.008)
3–6 months until exhaustion, (reference category)	0	
6–12 months until exhaustion	−0.064***	(0.006)
12–24 months until exhaustion	−0.093***	(0.008)
More than 24 exhaustion until exhaustion	−0.100***	(0.013)

Note: The model includes calendar time fixed effects, labor market history fixed effects and individual characteristics as controls.* significant at a level of 10%, ** significant at a level of 5%, *** significant at a level of 1%.

hinges again on a common trend in exit rates to work between individuals with different labor market histories.[24]

Table 6 shows the estimated effects of the UI benefits entitlement period on the job finding rate.[25] The estimation results show that increasing the UI entitlement period significantly reduces the job finding rate. Each additional month of UI entitlement reduces the job finding rate from the start of the spell by about 1%. There is a clear peak in the exit rate to work around the moment of exhaustion. The job finding rate is highest in the month before and the month after exhausting UI benefits. The exit rate increases as the moment of exhaustion is approaching and declines again in the six months after exhaustion to the reference level before exhaustion.

Standard job search models predict that job finding rates stay constant after exhaustion of UI benefits as reservation wages remain low and job search effort high. Like many previous empirical studies, we find that job finding rates actually fall after UI benefits exhaustion. This pattern is often found in the literature (e.g. Katz and Meyer, 1990; Meyer, 1990; Moffitt, 1985) and suggests that not only the level of benefits is important in explaining the transition rate from unemployment to employment.

Standard job search theory predicts larger peaks in the exit rate to work around the moment of exhaustion for individuals who face a larger income drop after UI exhaustion (e.g. Van den Berg, 1990). Our findings are in line with this, we find the largest peak for individuals with high UI benefits and entitlement to welfare and individuals without welfare entitlement.[26] For individuals not facing an income drop, we observe a much smaller peak in the exit rate to work in the months before and after exhaustion. This indicates that the level of benefits is not the only element of the benefits program which is important for job finding. The moment of exhausting UI benefits may be considered as an implicit deadline to unemployed workers, for example, because there is a larger negative stigma associated to collecting welfare benefits than UI benefits. Alternatively, the transition from UI to welfare may be associated with uncertainty, which unemployed workers dislike. Finally, recall that the take-up rate of welfare benefits is only 48%, so some unemployed workers voluntarily accept a drop in income at the end of UI entitlement. The results also indicate that unemployed workers change their job search behavior earlier in anticipation of a benefits drop if this drop is more substantial. When we compare other subgroups, we observe larger peaks for individuals with an entitlement to more than 12 months, men and individuals older than 50.

[24] We artificially censor all unemployment spells after three years. This avoids that for the pre-reform data we have a longer observation period and also reduces the impact of the financial crisis which started to affect the Dutch labor market late 2011.

[25] We take the time interval three to six months before exhaustion as the reference category since the minimum entitlement period is four months. As such, for every possible length of the entitlement period there are individuals observed in the reference category.

[26] Tables G1–G3 in Appendix G show the estimated heterogeneous effect.

8. Conclusion

In this paper we use two identification strategies to study the effect of the entitlement period to UI benefits on the exit rate to work and post-unemployment job quality. First, we use a difference-in-differences model which exploits a substantial reform in the Dutch UI system in October 2006. The reform reduced, on average, the entitlement period by about four months, but there are groups of workers for whom the entitlement period did not change or even increased. Second, we use a regression discontinuity design which exploits that prior to the reform the entitlement period was a step function of the worker's labor market history. Based on month of birth, we identify workers with an identical number of employment years but a different UI entitlement period. The difference just below and above the thresholds is, on average, seven months and can be at most 12 months.

The estimation results on job finding rates from both approaches concur, and are in agreement with earlier literature. We find that reducing the UI entitlement period increases the job finding rate, which indicates the presence of moral hazard. A 10-week extension of benefits increases the non-employment time with 6–9 days. We have used a hazard rate model to estimate the underlying dynamics in job finding. This model shows that reducing the entitlement period increases job finding rates from the start of unemployment, but job finding rates peak just before the moment of exhausting UI benefits and declines again afterwards. All estimates stress that a reduction in the UI entitlement period decreases cumulative UI benefits and increases cumulative earnings, which results in an increased total income.

Whereas there is consensus in the empirical literature on the effect of the UI entitlement period on job finding, empirical evidence on the effects on job quality is mixed. Job search theory states two opposite effects of reducing the maximum UI entitlement period on job quality, i.e. unemployed workers lower their reservation wage and they might suffer less from skill depreciation because they find work faster. The difference-in-differences analysis shows at most modest negative effects of reducing the UI entitlement period on the quality of the first job. We find some indication that unemployed workers are slightly more inclined to accept a temporary job. Job turnover after starting working again is high, causing that in the long run the effect on the job finding rate is the dominating factor. However, the regression discontinuity analysis shows a positive effect on the number of working hours in the first job, and a positive effect on the daily wage in the long run. Both approaches identify the effect of reducing the UI entitlement period for a different treated population in a different time period with different labor market conditions. In particular, the regression discontinuity analysis cannot identify effects from groups of workers who are observed to respond relatively strongly in the difference-in-differences analysis.

We find some heterogeneity in effects of the UI entitlement period. First, young workers are much less responsive than workers above age 35. Most previous studies exploit age thresholds in benefits entitlement, which lie between 40 and 55 years old. Young workers have, therefore, not received much attention. Second, the effect of reducing the UI entitlement period is most substantial for unemployed workers with already relatively short UI entitlement periods and occurs just before the UI entitlement period expires. This is consistent with the spike in job finding rates just before exhausting benefits and the conclusion that unemployed workers have relatively high discount rates.

We use our empirical results from the difference-in-differences analysis to quantify the expenditures associated to the UI reform in 2006. We consider the cohort of workers entering UI the year before the reform and follow them for three years. Total expenditures on UI benefits within

these three years equal 2756 million euros. Our empirical results show that the reform reduces this by 86 million euros, which is a reduction of 3.1%. At the same time, due to increased job finding the cumulative earnings within three years increases with 182 million euros and the cumulative income – the sum of UI benefits, wages and welfare benefits – increased with 96 million euros. If the reform would have been implemented one year earlier, the total income of individuals within this period would have increased with 0.6%.

Supplementary materials

Supplementary data associated with this article can be found, in the online version, at 10.1016/j.labeco.2019.02.003.

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